

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[EIGHTH SERIES.]

"..... per litora spargite muscum,
Naiades, et circum vitreos considite fontes:
Pollice virgineo teneros hic carpate flores:
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Dea pelagi, et pingui conchylia succo."
N. Parthenii Giannettasi, Ecl. 1.

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I.—*Remarks on some Copepoda from the Falkland Islands collected by Mr. Rupert Vallentin, F.L.S.* By THOMAS SCOTT, LL.D., F.L.S.

[Plates I. & II.]

SEVERAL expeditions engaged in scientific research in the southern oceans have, from time to time, visited the Falkland Islands and collected samples of the fauna of this far-distant British dependency; consequently, as the Rev. T. R. R. Stebbing remarks, "the general features of the zoology of the Falklands are tolerably well known"*. So far, however, as the Crustacean fauna is concerned, marine species appear to have received rather more attention than those found in the fresh waters of the Islands.

One of the later visits to these Islands was that of the Swedish South Polar Expedition in 1901-1903. Some fresh-water collections from the Falklands were brought home by this expedition, and the Copepoda contained in these were reported on by Dr. Sven Ekman in 1905 in *Lieferung 4*, vol. v. of the account of the expedition.

* Proc. Zool. Soc. Lond., May 1900, p. 517.

Few attempts appear to have been made to systematically examine the fresh-water Entomostraca of the Islands, and the collections now under consideration are therefore the more interesting, as they represent most of the fresh-water areas that are of any importance.

A paper describing some results of Mr. Vallentin's researches at the Falklands in 1898-1899 has already been published. This paper, prepared by the Rev. T. R. R. Stebbing, appeared in the 'Proceedings of the Zoological Society of London' in May 1900, and deals with Crustacea belonging to the Brachyura, Macrura, Schizopoda, and Isopoda—all of them marine except *Trichoniscus magellanicus*, specimens of which were "found in a damp cave on the top of a hill 450 feet high 2 miles distant from Stanley."

The Copepoda referred to in the following notes were obtained in gatherings from various places, and were collected at various times during 1909, 1910, and 1911. Most of the samples examined were from fresh-water localities, but a few of them were marine, and these were collected chiefly by tow-net in the vicinity of the Islands. The number of fresh-water samples was considerable, and in some of them Copepoda were tolerably plentiful; but there was not much variety—indeed, some of the gatherings consisted almost exclusively of one or two species. Calanoids and *Cyclops* were generally present, but no Harpacticids were noticed in any of the fresh-water samples. The following is a description of species belonging to the Calanoida and Cyclopoida observed in the collections* :—

CALANOIDA.

Fam. Centropagidæ.

Genus BOECKELLA, de Guerne and Richard, 1889.

In this genus the inner rami of the last pair of legs in the male are more or less rudimentary and almost devoid of armature. Only one species of *Boeckella* was observed in Mr. Vallentin's collections.

Boeckella michaelsoni (Mrazek). (Pl. I. figs. 4-6.)

1901. *Boeckellina michaelsoni*, Mrazek, (5) p. 11, figs. 5, 10, 20, 23, *et seq.*

* Notes on some marine Harpacticoida &c. observed in the marine samples will appear later.

1901. *Boeckella pygmæa*, Daday, "Diagnoses præcursoriæ Copepodorum novorum e Patagonia," in Termesz. Füzet. 24.
1902. *Pseudoboeckella pygmæa*, Daday, "Mikroskopische Süßwasserthiere aus Patagonien," *op. cit.* 25.
1905. *Pseudoboeckella anderssonorum*, Ekman, (2) p. 10, pl. i. figs. 3-5.
1905. *Boeckella michaelsoni*, Ekman, (3) p. 603.

This species occurred in at least eight gatherings, and both males and females bearing ovisacs were observed. The species, though comparatively small, is readily distinguished, both the female and male, but especially the latter, by the structure of the fifth pair of legs. In the female the spine on the inner distal angle of the second joint of the outer ramus is comparatively feeble and shorter than the third joint, and this third joint, which is smaller than the preceding one, carries only three bristles; the two terminal bristles are unequal in length, one being tolerably stout and spiniform and longer than the other; the third bristle, which is also small, springs from near the lower end of the outer margin.

In the male the fifth pair of legs are tolerably long and slender and unsymmetrical. The left leg is somewhat shorter than the other, and the first joint of the outer ramus has the inside margin expanded and convexly and evenly rounded, and with the rounded edge fringed with small hairs; the second joint is narrow and shorter than the first, and is armed with a terminal spiniform prolongation; the inner ramus is very rudimentary, and consists of a small single-jointed appendage. The right leg is elongated and slender, and the inner ramus is short and feebly developed, as shown in the drawing (fig. 5). Figure 6 represents the fifth pair of legs of an immature male.

Genus PSEUDOBOECKELLA, Mrazek, 1901.

This genus is nearly allied to *Boeckella*, and there is so close a resemblance between the females of the two that the species can with difficulty be determined where female specimens only are available. In the male the difference between them is more distinct, especially in the structure of the last pair of legs, for while the inner ramus of the left leg is, as in *Boeckella*, quite rudimentary, that of the right is tolerably well developed, as shown by the drawings. Three species belonging to this genus have been observed in the collections.

Pseudoboeckella poppei, Mrazek. (Pl. I. fig. 9.)

1895. *Boeckella brasiliensis*, Poppe and Mrazek (not Lubbock), (6) p. 13, with plate.

1898. *Boeckella brasiliensis*, Giesb. & Schmeil. Das Tierreich, 6 Lieferung, Copepoda, I. *Gymnoptera*, p. 60.
 1901. *Pseudoboeckella poppei*, Mrazek, (5) p. 6.
 1902. *Boeckella poppei*, Daday, "Mikroskopische Süßwasserthiere aus Patagonien," in Termesz. Füzet. 25.
 1905. *Boeckella entzi*, Ekman, (2) p. 14, pl. i. fig. 6.
 1909. *Pseudoboeckella poppei*, Sars, (13) p. 22, pl. iii.

The structure of the fifth pair of thoracic legs in the male constitutes one of the more important characters by which this species may be distinguished. The inner ramus of the left leg is very rudimentary, as in *Boeckella*, but that of the right is tolerably well developed and consists of three distinct moderately stout joints, and the end joint is provided with four spiniform setæ, two on the outer margin and two at the apex, as shown in the drawing (fig. 9). A full description, with excellent figures of this species, will be found in G. O. Sars's paper on fresh-water Entomostraca from South Georgia referred to above.

This species was obtained in a fresh-water gathering from Hill Cove, but in none of the other samples examined.

Length of female 2·8 mm. ; male somewhat smaller.

Pseudoboeckella brevicaudata (Mrazek).

(Pl. I. figs. 1, 7, 10.)

- (?) 1875. *Centropages brevicaudata*, Brady, (1) p. 162.
 1901. *Paraboeckella brevicaudata*, Mrazek, (5) p. 8, figs. 6, 7, 12, 21, et seq.
 1905. *Boeckella vexillifera*, Ekman, (2) p. 16, figs. 7-12.
 1905. *Pseudoboeckella brevicaudata* (Mrazek), var. *vexillifera*, Ekman, (3) p. 601.

This species (or variety) was obtained in gatherings from moor-pools and other small bodies of fresh water, and both males and females with ovisacs occurred in the same gatherings.

Female.—In this species the abdomen of the female is short, three-segmented, and with the middle segment small. The fifth pair of thoracic legs has the outer ramus tolerably stout and elongated, the inner distal angle of the second joint is produced into a strong curved spine much larger than that in *Pseudoboeckella poppei*; the end joint is rather narrower than the second and is one and a half times its length, and carries three short setæ on the inner margin, one about the middle of the outer margin and three at the apex, the middle apical seta being tolerably stout and elongated. The inner ramus only reaches to a little beyond the second joint of the outer and is much narrower than it; the end joint of the

inner ramus is furnished with two setæ on the inner margin, one on the outer, and three on the rounded apex.

Male.—The right leg of the fifth pair of thoracic feet in the male is rather shorter than the left, the proximal joint of the outer ramus is tolerably expanded, but the terminal portion is very narrow, twisted, and claw-like, and is articulated on the inner aspect of the proximal joint, as shown in the figure (fig. 1); the inner ramus is three-jointed, the first joint is moderately stout, but the other two are slender, and the last one ends in one or two spiniform setæ; the left leg is tolerably slender and elongated, and the inner ramus is very rudimentary (fig. 1).

Length of the female about 2 mm., the male being rather smaller. The length, however, varies to some extent in different specimens.

Dr. Mrazek records the examination of specimens of this form sent from South Patagonia, and identifies the species with *Centropages brevicaudatus*, Brady, from Kerguelen Island*; but, as Dr. Brady had not seen the male of the species he describes, and as some of the more important specific characters are derived from the male, there appears to be some doubt as to whether the two species are identical. Dr. Ekman subsequently obtained specimens of the same species, but not having at the time seen Mrazek's description, he described them as new under the name *Boeckella vexillifera*†; this he afterwards changed to "*Pseudoboeckella brevicaudata* (Mrazek), var. *vexillifera*, Ekman"‡. I find, on comparing the description and figures of Dr. Ekman with those by Mrazek, that there does not appear to be any material difference between them; I have therefore ascribed the species to Mrazek, but should Mrazek's identification be found correct, his name will be replaced by that of Dr. Brady.

Pseudoboeckella vallentini, sp. n. (Pl. I. figs. 2, 8, 11.)

Female.—The female of this species has a general resemblance to that of *Pseudoboeckella poppei*, but is considerably smaller. The cephalothorax is tolerably robust and somewhat dilated in front, but tapers slightly towards the posterior end; the lateral expansions of the last thoracic segment

* "Magalkænsische Sammelreise," Süßwasser-Copepoden, p. 8, figs. 6, 7, 12, 21, 26, 27, 29, 45, 46, 50, and 52 (1901).

† 'Wissenschaftliche ergebnisse der Schwedischen Südpolar-expedition 1901-3,' Band v. Lief. 4, Cladocera u. Copepoda, p. 16, Taf. i. figs. 7-12 (1905).

‡ Zool. Anz. B. xxix. no. 19, p. 601 (Dec. 1905).

form narrow prolongations which extend backward to about the last segment of the abdomen (fig. 11). Abdomen short, about half the length of the cephalothorax, composed of three segments, the first large and equal to fully the combined lengths of the next two, second and third subequal; caudal rami short and furnished with five short and stout bristles round the distal end.

Antennules elongated and reaching to about the last segment of the abdomen. The other appendages of the cephalosome and also the swimming-legs are all somewhat similar to the species named above, except that in the fifth pair of thoracic legs the spiniform process on the inside of the second joint of the outer ramus is larger and reaches beyond the end of the third joint and has its extremity slightly hooked.

Length about 1.6 mm.

Male.—The male, as is usual, is smaller and more slender, and the abdomen proportionally longer than in the female. The fifth pair of thoracic legs differ very much from those of the female, and they are also unsymmetrical; the inner ramus of the left leg is very rudimentary; in the outer ramus the first joint is of an oval form and considerably dilated and becoming somewhat gibbose interiorly; the distal portion of the ramus is narrow, strongly curved, and attenuated towards the extremity; the first joint is also armed with a stout and moderately long spine near the lower end of the outer margin; this spine projects outward from the joint, as shown in the figure (fig. 2), and which is apparently its normal position. The outer ramus of the right leg is distinctly shorter than that of the left, but is scarcely so robust; the inner ramus is tolerably stout and broad, and reaches to somewhat beyond the end of the first joint of the outer ramus, and is rather wider towards the proximal end, where the inner margin expands and becomes somewhat gibbose and carries one or two short spines; the distal end of the inner ramus is bluntly rounded and is provided with two short spiniform setae on the outer distal angle, while on the inner angle and extending a short distance up the inner margin are five or six short and stout hooks, as shown in the figure (fig. 2). Moreover, the articulation of the inner ramus to the basal joint forms a distinct hinge, which permits of the ramus turning inwards so as to interlock with a recess on the inside margin and near the proximal end of the left leg. A spiniform seta springs from the outer distal angle of the basal joint, and a small fork-like appendage may also be observed on its inner aspect (fig. 2). In the structure of the

fifth pair of feet in the male and in the armature of the fifth pair in the female this species differs from any other known to me.

The first joint of the outer ramus of the fifth pair is represented in the figure as seen under the cover-glass, and is somewhat flattened, but before being subjected to the pressure of the cover-glass it was seen to have a distinctly swollen and bladder-like appearance.

Genus *PARABROTEAS*, Mrazek, 1901.

The genus *Parabroteas* may be distinguished by the peculiar character of the posterior maxillipeds, which resemble those in *Limnocalanus*, and particularly by the structure of the fifth pair of legs in the male.

Parabroteas sarsi (Daday). (Pl. II. figs. 1-4.)

1901. *Limnocalanus sarsi*, Daday, "Diagnoses præcursoriæ Copepodorum novorum e Patagonia," in Termesz. Füzetek. 24.

1901. *Parabroteas michaelsoni*, Mrazek, (5) p. 12, figs. 8, 9, 15, 16, et seq.

1905. *Gigantella sarsi*, Ekman, (2) p. 22, figs. 15-21.

1909. *Parabroteas sarsi*, G. O. Sars, (13) p. 29, pl. iv.

A single specimen (a female), which appears to belong to this species, occurred in a gathering from some lower pools on Mount Adam. The specimen measured about 3.8 mm., and is therefore much smaller than some others that have been recorded. G. O. Sars states that specimens of *Parabroteas sarsi* have been found reaching even to 7 mm. in length. It also differs in the abdomen being shorter than in some of the figures of this species which I have seen, but this may be accidental by the joints having become telescoped. It is evident, however, when the structure of the more characteristic appendages is compared with that of the similar appendages described and figured by Mrazek and G. O. Sars, that, notwithstanding the differences alluded to, the Mount Adam specimen belongs to the species to which it is ascribed. *Parabroteas sarsi* has already been recorded from the Falkland Islands by Dr. Ekman*, and his description and figures of the posterior maxillipeds and of the female fifth pair of thoracic legs agree with the specimen recorded here. The terminal setæ of the posterior maxillipeds are strong and spiniform (fig. 2). In the female the second joint of the outer ramus of the fifth pair of legs has

* See his paper on the Copepoda of the Swedish South-Polar Expedition, already referred to.

the inner distal angle produced into a strong spine that reaches beyond the end of the third joint; this joint is small and is provided with four short setæ on its inner margin and two at the lower end of the outer margin, and the terminal spine is long and tolerably stout, and fringed with minute bristles along its inner edge (fig. 4).

Fam. Calanidæ.

Genus DREPANOPUS, G. S. Brady, 1883.

Drepanopus pectinatus, G. S. Brady.
(Pl. II. figs. 10, 11.)

A number of specimens of this *Drepanopus* occurred in a tow-net gathering collected in the vicinity of the Islands on November 1909. Both males and females were fairly numerous, and several of the latter carried ovisacs. The same species was also present in another gathering collected a few days afterwards 3 miles south-eastward of Speedwell Island; and specimens also occurred in a third gathering in which were numerous larval decapods. One or two of the larger females with ovisacs measured about $2\frac{1}{2}$ mm. in length. A few small and apparently adult specimens occurred, which at first were considered as probably belonging to *D. forcipatus*, Giesb., but on a careful examination of these no anatomical differences of sufficient importance to separate them were revealed.

Fam. Acartiidæ.

Genus ACARTIA, Dana, 1846.

Acartia tonsa, Dana.

This was the only *Acartia* observed in the marine tow-net samples. It was tolerably frequent in the gathering containing the larval decapods already referred to under *Drepanopus*.

CYCLOPOIDA.

Fam. Oithonidæ.

Genus OITHONA, Baird, 1843.

Oithona helgolandica, Claus. (Pl. I. fig. 12.)

1863. *Oithona helgolandica*, Claus, Die Frei Lebenden Copepoden, p. 105, pl. xi. figs. 10, 12.

1866. *Oithona similis*, Claus, Die Copepoden-Fauna von Nizza, p. 14.

This *Oithona* was tolerably frequent in all the three marine tow-net samples already mentioned, and was the only one observed. In this species the rostrum is short, stout, and hook-like, and is turned downward at nearly a right angle (fig. 12).

This species has frequently been recorded under the name of *Oithona similis*, but, according to Prof. G. O. Sars, *O. similis* and *O. helgolandica* are identical, and the latter, being the older name, should be preferred.

The distribution of *Oithona helgolandica* extends apparently from the Arctic to the Antarctic Ocean. Dr. Giesbrecht records it from 71° south latitude, and Prof. G. O. Sars has examined specimens collected off the coast of New Zealand, and "compared them with northern specimens, without being able to detect any difference whatever"*. The Falkland specimens measured fully 1 mm. in length.

Fam. Cyclopidae.

Genus *Cyclops*, Müller, 1776 (part.).

Cyclops prasinus, Fischer. (Pl. II. figs. 5-7.)

1860. *Cyclops prasinus*, Fischer, Beitr. z. Kenntn. d. Entomostraceen, pp. 652-654, Taf. xx. figs. 19-26 a.

This species occurred very sparingly in a gathering from a small fresh-water pond near the sea. Besides the northern distribution of the species, it has also been reported from Valdivia, Chile, and from the Argentine. In this species the antennules are twelve-jointed and the fifth pair of legs in the female are each provided with three elongated setæ (fig. 6). The caudal segments are tolerably short (fig. 7).

Cyclops michaelseni, Mrazek, var. *falklandi*.

(Pl. I. fig. 3; Pl. II. figs. 8, 9.)

The small *Cyclops* recorded under this name occurred in several of the fresh-water gatherings from the Falklands.

This form is apparently identical with *Cyclops michaelseni*, Mrazek, except in the structure of the last pair of thoracic legs, and in this respect it agrees better with *Cyclops lobulosus*, Ekman. In that species, however, the antennules are described as consisting of twelve joints, and the proportional lengths of the various joints also differ. Both *Cyclops michaelseni*, Mrazek, and *Cyclops lobulosus*, Ekman, have already been recorded for the Falkland Islands. In the

* 'Crustacea of Norway,' vol. vi. parts 1 & 2, p. 9 (1913).

form under consideration the antennules (fig. 8) consist of eleven joints, the proportional lengths of which are, approximately, as shown in the formula appended:—

Number of the joints . .	1	2	3	4	5	6	7	8	9	10	11
Proportional lengths . .	20	6	12	5	4	7	13	11	6	8	11

In the fifth pair of thoracic legs the basal joint is moderately short and broad and carries a long seta on its outer distal angle, the second joint is small and is furnished at the apex with a long seta and a short spine (Pl. I. fig. 3); a considerable space occurs between the seta at the distal angle of the basal joint and the point of attachment of the second joint, as shown in the figure. The caudal segments are fully twice as long as the last segment of the abdomen (Pl. II. fig. 9).

Some of the Literature referred to in the Text.

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- (3) 1905. —. "Die Systematik und Synonymik der Copepodengattung *Boeckella* und verwandter Gattungen." Zool. Anzeiger, Bd. xxix. Nr. 19.
- (4) 1889. GUERNE, JULES DE, et JULES RICHARD. "Révision des Calanides d'eau douce." Mémoires Soc. Zool. de France, tome ii.
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- (6) 1895. POPPE, S. A., und MRAZEK, AL. "Entomostraken des Naturhistorischen Museums in Hamburg (2, Entomost. v. Sud-Georgien)." Jahrb. d. Hamb. wissenschaftl. Anstalten, xii. Beiheft.
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- (13) 1909. Sars, G. O. "Freshwater Entomostraca from South Georgia." *Op. cit.* B. xxx. Nr. 5.
 (14) 1910. Sharp, Richard W. "Notes on Marine Copepoda &c." *Proc. U.S. National Museum*, vol. xxxviii. pp. 405-436.
 (15) 1900. Stebbing, T. R. R. "On some Crustaceans from the Falkland Islands, collected by Mr. Rupert Vallentin." *Proc. Zool. Soc. London*, May 22nd, 1900, pls. xxxvi.-xxxix.

EXPLANATION OF THE PLATES.

PLATE I.

- Fig.* 1. *Pseudoboeckella brevicaudata* (Mrazek), ♂, fifth feet.
Fig. 2. *Pseudoboeckella vallentini*, sp. n., ♂, fifth feet.
Fig. 3. *Cyclops michaelsoni*, var. *falklandi*, nov. var., ♀, fifth foot.
Fig. 4. *Boeckella michaelsoni* (Mrazek), ♀, fifth foot.
Fig. 5. " " " ♂, fifth feet.
Fig. 6. " " " ♂ (juv.), fifth feet.
Fig. 7. *Pseudoboeckella brevicaudata* (Mrazek), ♀, fifth foot.
Fig. 8. *Pseudoboeckella vallentini*, sp. n., ♀, fifth foot.
Fig. 9. *Pseudoboeckella poppei*, Mrazek, ♂, fifth feet.
Fig. 10. *Pseudoboeckella brevicaudata* (Mrazek), ♀ posterior thoracic segments and abdomen.
Fig. 11. *Pseudoboeckella vallentini*, sp. n., posterior thoracic segments and abdomen.
Fig. 12. *Oithona helgolandica*, Claus, ♀, rostrum

PLATE II.

- Fig.* 1. *Parabroteas sars* (D day), ♀, × 15.
Fig. 2. " " ♀, second maxilliped.
Fig. 3. " " ♀, first foot.
Fig. 4. " " ♀, fifth foot.
Fig. 5. *Cyclops prasinus*, Fischer, ♀, antennule.
Fig. 6. " " " ♀, fifth foot.
Fig. 7. " " " ♀, abdomen.
Fig. 8. *Cyclops michaelsoni*, Mrazek, var. *falklandi*, var. nov., ♀, antennule.
Fig. 9. Ditto, ♀, abdomen.
Fig. 10. *Drepanopus pectinatus*, G. S. Brady, ♀, fifth feet.
Fig. 11. " " " ♂, fifth feet.

II.—*Diagnoses of new Marine Fishes collected by the British Antarctic ('Terra Nova') Expedition.* By C. TATE REGAN, M.A.

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1. ANTARCTIC FISHES.

Paraliparis antarcticus, sp. n.

D. 60. A. 55. P. 19+3-4+4-5. Teeth villiform, in